

CROP TALK

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What's Up This Summer in Ag Education Events?

by Ian McDonald, Applied Research Coordinator, OMAF/MRA

The summer of 2013 continues the tradition of excellent events worthy of your time. The OMAF and MRA Field Croppers, University of Guelph, OSCIA and other producer organizations are putting together the following events:

South-West Crop Diagnostic Days
Wed-Thurs July 3-4th,
Ridgetown Campus, University of Guelph
http://www.diagnosticdays.ca/

Ontario Forage Expo
July 10th, 2013
Ikendale Farm, 358 Concession 12, Greenock, Walkerton (west of Huron Tractor on Township Road 2)
www.ontarioforagecouncil.com/programs/ontario-forage-expo.html

FarmSmart Expo
Thurs - Fri July 11-12
Elora Research Station, University of Guelph
http://www.ghscia.com/

Eastern Ontario Crop Diagnostic Days
Tuesday—July 16th
Winchester Research Station, University of Guelph

Soil Quality Workshop,
Thursday, August 8th
Mitchel Area

North American Manure Expo,
Wednesday August 21st,
Arkell Research Station, University of Guelph
http://www.agannex.com/manure-manager/manure-expo

Keep current on additional events by being on the OSCIA e-mail distribution list (e-mail Neil Moore at nmoore@i-zoom.net), or go to the OSCIA website at www.ontariosoilcrop.org/en/events/upcomingevents.htm .

The OMAF and MRA Dateline Calendar is a new service for users and event/workshop organizers to advertise on. www.omaf.gov.on.ca/english/rural/edr/events-training.htm.

The value of these events is in the demonstrations/ diagnostics presented, and also in the opportunity to discuss these and other topics with your neighbours, new acquaintances and the experts.

Wild Parsnip Control

by Gilles Quesnel, Field Crop IPM Specialist, and Mike Cowbrough, Weed Management Program Lead, OMAF/MRA

Wild parsnip is a common weed in eastern Ontario, and is spreading in many other parts of the province. It is a biennial, or short-lived perennial (Figure 1). While wild parsnip does not have the notoriety of giant hogweed, its sap does contain some of the same chemicals (furanocoumarins). When these compounds come in contact with the skin, they cause severe burn-like rashes and/ or blisters (Figure 2).

Figure 1. *Vegetative (left) and Flowering (right) Wild Parsnip*

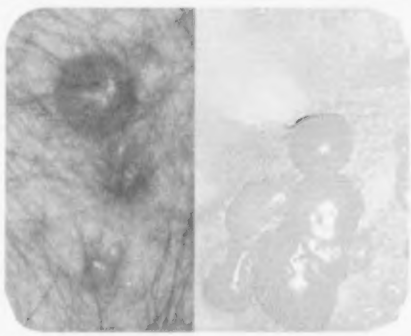


Figure 2. *Skin Reaction to Wild Parsnip Sap*

Description
Wild parsnip occurs mainly on roadsides, fencerows, pastures, and to a lesser extent, on the edges of cropped fields. Wild parsnip burns differ from rashes caused by poison ivy. The wild parsnip sap causes a skin reaction by destroying skin cell, whereas poison ivy causes an allergic skin reaction. More information on the biology of wild parsnip is available at: weedinfo.ca (http://bit.ly/KWmR6w).

Control
Wild parsnip can only be mechanically controlled by cutting the plant just below the soil surface. While mowing reduces seed production, it will not kill the plant or reduce the established wild parsnip population. Glyphosate is effective at controlling wild parsnip. However, glyphosate also destroys all the vegetation sprayed, which results in exposure of bare ground. This will usually lead to the establishment of new weeds, soil erosion and ditch bank destabilization.

OMAF and MRA field trials were conducted to evaluate the efficacy of a number of broadleaf weed herbicides, which would control wild parsnip without impacting grass vegetation in the lower canopy. Table 1 summarizes the percent visual control of wild parsnip obtained with different herbicides applied in June, August and October. Note that the efficacy of some products varied significantly based on the timing of application. Herbicides were not all

evaluated at the 3 different times of application.

Timing of Application	Percent Control		
	June 7th	August 6th	October 10th
Distinct 70 WG	25%		85%
Milestone	50%	15%	95%
Truvist	95%	95%	
Clearview		85%	
Classic 25DF			65%
Estaprop Plus			60%
Banvel II			25%
Mowing	0%		

Table 1. *Average wild parsnip control obtained with various post-emergence broadleaf weed herbicides at different timing of application.*

Truvist provided the most consistent control of wild parsnip at 95%. Truvist is currently going through the regulatory process and should be available for use in Ontario later this year. Of the herbicides currently available, Clearview provided the best control in these trials.

For more information on products and product rates for the control of wild parsnip, refer to the ROADSIDES & NON-CROP AREAS section of OMAFRA Publication 75, Guide to Weed Control, available at: http://bit.ly/159Jnau.

Pasture Utilization

by Jack Kyle Grazier Specialist, OMAF/MRA

Pasture is an excellent low cost means of feeding livestock, but requires proper management of the forage and the livestock. The forage must be managed to optimize growth, and the livestock must be managed to optimize utilization. Your goal as you manage your pastures is to grow as much grass as possible and have it consumed at the point of optimum nutrition and quantity with minimal waste. How much of the pasture growth is actually eaten and utilized by the grazing livestock is going to influence the success and profitability of your pasture business. Producing a lot of growth is of little benefit it is not utilized by livestock.

Factors Affecting Utilization

- Forage that is over-mature will not be effectively utilized. Mature, tall grass is hard for the animals to bite off and also difficult to digest.
- Forage that is too short (less than 5-7 cm) does not allow the animal to get a big bite. They spend extra time walking to get enough forage.
- Forage that is contaminated by feces or urine will not be eaten.
- Forage that is tramped or laid on is less likely to be eaten.
- If there is a wide choice of plants to graze, the most palatable will be eaten and the less desirable will be left behind. These plants then have a chance to continue growing, and over time will dominate the pasture.

Ways To Improve Utilization

- Minimize the area and amount of grass that is avail able at any one time. There will be a higher proportion of fresh grass available to the animal.
- Smaller paddocks reduce walking and tramping, which means more time for grazing and resting.
- Provide water in the paddock. This minimizes the amount of time spent away from the pasture and not eating.
- If there are significant manure patties that are not breaking down, consider harrowing to spread these patties out and speed up the breakdown. Cattle eating grass that is optimum for performance will have loose manure that will not be in dried patties.
- If there are weeds and mature plants, clipping can improve utilization.
- Livestock grazing a "new" or "fresh" paddock focus on grazing, become full quicker and will spend more time resting rather than wandering looking for another bite of palatable grass.
- Intake of high quality forage is much better than low quality. Higher Acid Detergent Fibre (ADF) decreases intake because of slower digestive passage.

Number of Paddocks and Frequency of Moves

Factors that influence pasture utilization are:

- the number of paddocks, and
- the frequency of moves.

From the Purdue Extension Forage Field Guide:

- continuously grazed pasture will result in 40% utilization of the forage
- a 4 paddock system will result in 45% utilization
- an 8 paddock system will have about 60% utilization
- a 12 paddock system will have about 65% utilization
- moving to a 24+ paddock system will bring the utilization rate up to about 75%.

This is a huge increase in productivity of your pastures, almost doubling it.

Increasing the number of paddocks allows you to increase the frequency of moves to fresh pasture.

From the Purdue Extension Forage Field Guide:

- moving every 3 days to fresh pasture will give a 70% utilization rate,
- moving every 7 days reduces the pasture utilization rate to 50%, and
- 14 day moves results in only 40% utilization of the pasture.

The number of paddocks and frequency of moves go together. More paddocks allow for more frequent moves.

This results in a longer rest period for the grass to recover from the previous grazing, and more growth of fresh grass for the next grazing.

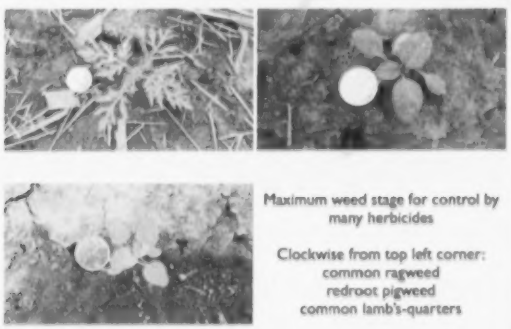
Take Half and Leave Half
These are seasonal utilization rates. At each grazing pass, the best results are achieved when you have the livestock remove about 50% of the available forage to allow the plant to quickly recover and re-grow. There is minimal impact on the root system when grazing about 50% of the top growth, but when more than 50% is removed the impact on the roots is much more significant.

The more paddocks you can organize for each group of livestock, and the more frequent the moves to a fresh paddock, the better the performance you will see from your pastures.

Can I Apply Post-Emergent Herbicides to Soybeans Before the 1st Trifoliate Stage?

by Mike Cowbrough, Weed Specialist, OMAF/MRA & Dr. Clarence Swanton & Dr. Francois Tardif, University of Guelph

You may be faced with a scenario where there is an abundance of weeds at or near the maximum leaf-stage for effective control, yet the soybean crop is not at the growth stage specified on the product label. As a producer or consultant, do you focus on targeting the weeds when at their labeled growth stage or do you wait until the crop reaches the labeled growth stage?

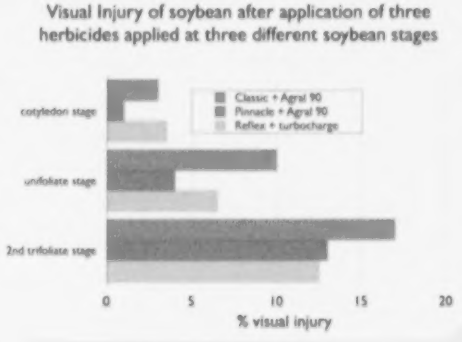


Maximum weed stage for control by many herbicides

Clockwise from top left corner:
common ragweed
redroot pigweed
common lamb's-quarters

The Department of Plant Agriculture (University of Guelph) in partnership with OMAF/MRA conducted a series of field trials with the following objectives:
1. To identify if there is an increased risk of crop injury when applying post-emergent broadleaf soybean herbicides prior to the 1st trifoliate growth stage specified on the product label.
2. To identify if there is a negative yield impact by applying post-emergent broadleaf soybean herbicides prior to the 1st trifoliate growth stage.

Methodology
Trials were conducted at the Elora Research Station in 2006 and 2007. Three common post-emergent broadleaf soybean herbicides were applied at 3 different soybean growth stages (cotyledon, unifoliate and 2nd trifoliate) and at two different application rates (normal field rates and twice the normal field rate). Visual crop injury, plant population, plant biomass and yield data were taken and compared to an untreated, weed-free control.



Results
- Soybean tolerance to all three herbicides was generally greater when applications were made prior to the 1st trifoliate stage (Figure 1).
- When all herbicide treatments were averaged, crop injury at the cotyledon, unifoliate and 2nd trifoliate stage was 2.5%, 7% and 14% respectively.
- Visual injury was temporary and no longer apparent by the end of July.
- Soybean yields were unaffected by herbicide applications made prior to the 1st trifoliate stage of soybean.

Conclusion
Broadleaf weeds emerging before or with the crop are extremely competitive and should be controlled when they are small (prior to the 8 leaf stage of weed growth in general). Based on two years of data, it would appear that if a herbicide is applied prior to the labeled crop growth stage there is no increased risk of crop injury and no impact on soybean yields.

Exploring Trends In Farmland Ownership and Rental

by Ian McDonald, Applied Research Coordinator, OMAF/MRA

There are many interesting trends happening in farmland ownership and leasing. The "Exploring Rural Land Use Conference", held in Guelph on May 14th was offered by the University of Guelph, Institute for the Advanced Study of Food and Agricultural Policy by FARE (Food, Agricultural and Resource Economics). Many aspects of farmland trends were discussed. Presentations can be viewed at

http://www.uoguelph.ca/fare/institute_presentations.html.

Farm Ownership Trends
Alfons Weeksink presented farm ownership trends based on surveys of farmers who rented land. He found that:

- 60% of land was held by owners who were on their own land;
- 8% were held investment companies,
- 13% held by owner investors; and
- 3% foreign ownership.

Rental agreements were typically 1 year handshakes that tend to get renewed annually but carry on for longer than10 years. 80% are cash rent as opposed to share crop or other types of agreements. Rates were generally higher where locals own the land.

Alfons posed the question "Does the environment lose with land rental"? His studies indicated this was not a significant issue. Owners usually only maintain contracts with farmers that manage the land in a way that landlords felt was reasonable. Since the supply of land is limited, landlords have some power to enforce this. He also found that renting farmers tend to manage their rented land the same as their own, using the same equipment and products. He did find a decrease in woodland, pasture, and other ecological features being retained, and perhaps less investment in soil. Long-term impacts may result so further study is needed.

Farmland Value Trends
James Bryan, Farm Credit Canada, suggested that land prices were strongly influenced by interest rates, cash receipts, government policy and world markets. In 2012, Canadian farmland values increased 19%, the highest rate ever. Values have generally increased more than 10% annually since 2007. North Dakota had the highest single year increase in land prices of 37.4%. Bryan suggested that farmland has been a better investment than S&P500 in the last 12 years, but it is about the same in the longer term.

Trends In South-western Ontario
Marleen Van Ham, an appraiser with Agri-Choice Real Estate Appraisals, discussed "Land value Trends in South -western Ontario". In the 1990's, it was new immigrants who were buying farmland, but not anymore. The trend for livestock farms to purchase land to meet obligations under the Nutrient Management Act (i.e. sufficient acreage for manure spreading) has also been satisfied and is no longer affecting prices. Class of farmland does not always impact values, but the location and ability for quick conversion to cropland often does. Pasture land is definitely being converted to crops, woodlots are being cut, and fence rows and ditches are being removed. Census data from 2006 and 2011 show a loss of 714,000 acres of forage acres (484,000 of hay and 229,000 of pasture).

Van Ham indicated that there is a real "hunger" for land right now. Much of it being driven by dairy and poultry producers who are not as able to expand, so are becoming the new cash croppers. She described it as a trend in farmland amalgamation, with surplus, older farmsteads being removed.
Recent farmland values recently peaked in January/ February, slightly lower in March, with the following "per tillable acre" prices:

- Elgin $6-18,000/acre,
- Norfolk $8-14,000 (with ginseng and potatoes soils at high end),
- Haldimand $6-10,000,
- Oxford $15-22,000,
- Brant $8-13,000,
- Waterloo $9-15,000,
- Perth $12-20,000,
- Huron $9-15,000.

The price slowdown was attributed to people taking a breather from getting caught up in the hysteria of land sales. Interestingly, land purchasers acknowledge that under these conditions, the price paid cannot be covered by the income generating potential of the land.

The sale of farms to operating farms is putting the squeeze on the straight cash cropper. They really can't pencil the land purchase themselves and are reliant on retired and other farmers to supply land to the rental market. However, now the retirees are selling the farms to active supply management farmers, so the cash cropper land base is shrinking. As land rental availability gets tighter, it becomes more competitive and costly.

Van Ham indicated that the value of vacant land is higher than land with buildings, houses and outbuildings that pose a risk and added cost to the purchaser. The presence of water courses and woodlots also detract from land values. Buyers are looking for tillable land in large parcels with no fence lines or obstructions for big equipment. Farmers generally don't want to be house landlords because it can be difficult to find good tenants. Even with good tenants, the costs of taxes, heating, and maintenance can erode any chance of generating a positive balance sheet on this activity.

Seeking the Green

by Greg Stewart, OMAF/MRA and Ben Rosser, University of Guelph

Optical sensors that measure the reflectance from the corn canopy and then attempt to use that information to manage the crop have been available for more than a decade now. GreenSeeker (TM Trimble) is one of the better known sensors. The main ambition behind Green-Seeker use is to improve nitrogen rate management. There is still significant interest in the country side on how

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to investigate and deploy optical sensors. Here are few ideas to consider.

Site Selection
The best fields for any variable rate technologies are fields with a high degree of variability where an average rate of product (seed, fertilizer etc.) across the entire field may result in significant portions of the field receiving rates that are much higher or much lower than optimum. Variability in soil texture, drainage, organic matter and topography may result in variability in nitrogen availability (supply, loss) and crop yield potential, which may result in variability is spatial nitrogen requirements.

Algorithm Theory
An algorithm is the formula responsible for converting a GreenSeeker reading (NDVI) from a field to a nitrogen recommendation. While specific algorithms differ in their response to field conditions and NDVI values based on calibrations to the local regions, the basic premise of most corn algorithms is the same.

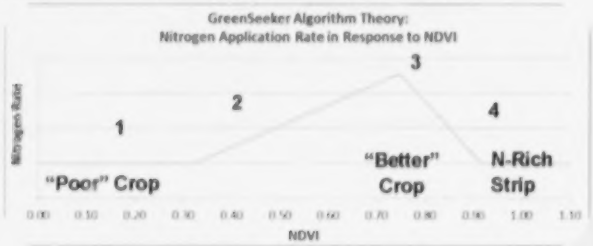

***Figure 1.** Basic premise of GreenSeeker nitrogen application algorithms for corn*

1. NDVI values which are very low relative to the N-rich strip (less chlorophyll, less plant biomass) are limited to a minimum amount of nitrogen which may be set by the applicator. Yield potential is expected to be low in these areas and factors other than nitrogen may be limiting, thus little yield response to nitrogen is expected.

2. As NDVI values increase, nitrogen recommendations increase. Yield potential is expected to increase relative to plants in the very low NDVI range (1). Low NDVI readings relative to the N-Rich strip suggest nitrogen may be limiting, and thus a response to nitrogen may be expected.

3. Yield response to nitrogen is expected to increase with NDVI up until a maximum (3).

4. Beyond the maximum point, nitrogen recommendations decrease with increasing NDVI, as NDVI values are approaching the N-rich strip where nitrogen is no longer a yield limiting factor. When NDVI is equal to or higher than the N-rich strip, nitrogen recommendations are equal to the minimum rate, as no yield response to additional nitrogen is expected.

Analysis
There are two possibilities that exist for how the GreenSeeker might improve your N management in corn.

1. It might be able to predict what the correct average rate for your fields are based on relative NDVI scores. Can it do better than the Ontario Corn N Calculator in getting the average right rate for your field if you feed it NDVI scores from the N rich strip and the unfertilized zones in the field? If this is the key question then yield results from the whole field length strip (i.e. weigh wagon measurements) will do the job.
2. Rather than change the average rate across the field, it may be advantageous to move N from where it is needed less to areas where it is needed more. This will improve yield per unit of N applied. In this case you must have more than whole strip data. You must have site specific GPS referenced data for both NDVI and yield all the way down the strip. This will enable you to cut up the strip and decide in a certain area whether the GreenSeeker algorithm was making the right decision or not. For example, if you go through a part in the field where response to N is low and yields are quite similar between strips receiving high N fixed rates and low N fixed rates then the GreenSeeker should be automatically pulling the N rate down at those locations. Only thorough site specific analysis of the strips can you determine where the GreenSeeker is making profit improving decisions.

Go to www.gocorn.net to read the full version of this article.

Low Disturbance Shallow Manure Injection Into Forages

by Christine Brown, Nutrient Management Specialist, OMAF/MRA

Fertilizing a forage crop after harvest can increase yield and quality by over 7 percent.
Manure applications to living crops have been done in forage, pasture, cereal, corn, and cover crops with varying success. Significant hurdles exist with respect to soil compaction, variable uniformity of application, nutrient use inefficiency, timing, trampling or other damage to the crop. However, the environmental and agronomic advantages of manure application into living crops are encouraging. Manure applied uniformly into living crops can reduce the use of commercial fertilizer, reduce odour and greenhouse gas emissions, trap ammonia-N, reduce overland flow, reduce leaching, and provide additional opportunities for manure application to a farm's land-base.

A toolbar that shallow injects manure in narrow bands is being evaluated for application opportunities throughout the growing season (side-dress applications in wheat, corn, application to forages and pastures, slurry seeded cover crops after cereal harvest). The results in Figure 1 are from the 2012 season where manure was applied after first-cut forage harvest and compares shallow injection to broadcast, surface banded, fertilizer equivalent and zero check.

Ammonia Loss

The choice with manure application is loss from volatilization, leaching or denitrification. Leaching and denitrification are highest with fall applied manure. Ammonia loss is highest with summer applied manure. Ammonia loss was measured using dosimeter readings. Results for 2012 (Figure 2) are consistent for losses measured over the past 4 seasons. The results show a consistent difference between "shallow injection", "surface band" and "close- to- surface splash- plate broadcast". The largest ammonia loss comes in the first 24 hours for all manure application methods and then levels off over the next few days. Rainfall in the first 24 hours after application reduces ammonia loss. Shallow injected manure had relatively lower losses, but still higher than ESN commercial nitrogen. Ammonia losses are higher with surface broadcast followed by surface banded and about 25% lower with the shallow injection. Shallow injection disturbs a narrow and of soil which allows a greater proportion of the manure to be infiltrated compared to surface band and broadcast. Losses are highest where manure rate is highest and in small ponded areas where infiltration is slower.

Fertilizer nitrogen was applied mainly as ESN – a slow-release nitrogen. Where hog manure was applied, the ESN rate was doubled to reflect manure nitrogen. Where the higher rate of ESN was applied, the total ammonia loss was also double. The dosimeter readings increased after a few days in a more linear pattern.

Forage Yield & Quality Impacts

Manure and fertilizer was applied after first-cut harvest. Forage yields for second-, third- and fourth-cut varied greatly from location and within treatments. The highest response came with third-cut. Figure 3 shows the yield and quality for each of the different application methods by cut. From all location results combined, a trend does emerge that shows the positive impact of yield from fertility – either manure or fertilizer. Yield responses between the different manure application systems were quite variable by location. The response to manure and fertilizer may have been impacted by moisture available at the different cuts. Some sites received rainfall in June which increased yield and quality by the next harvest date. In dry areas, the ammonia content of the manure may have resulted in some leave burn and may have delayed regrowth.

When quality and yield were combined in the MILK 2006[1] program, the impact of fertility is much clearer. There is still some variability, but fertility increased the overall combined yield and quality by 3-12%, with manure giving the larger increase. However, when comparing the treatment for second-, third- and fourth-cut individually, the yield response from third-cut ranged from 6 to 25% greater than the check treatment.

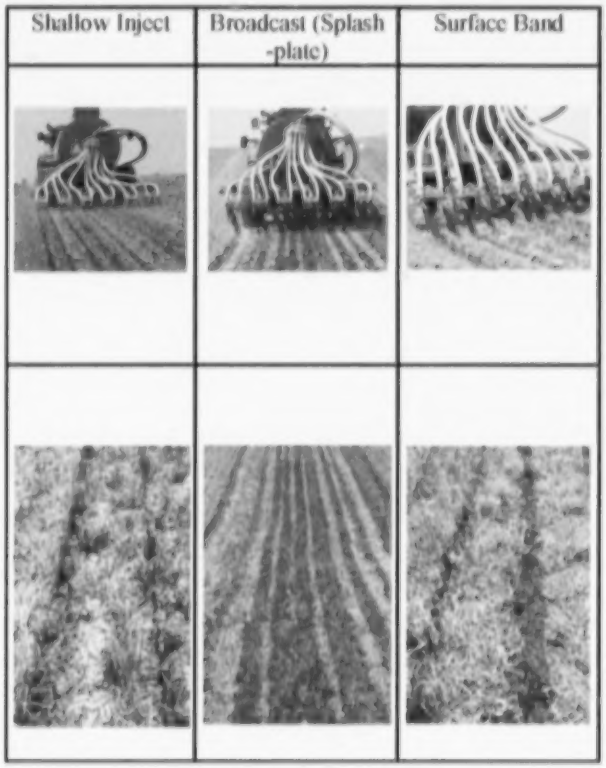

***Figure 1** – Manure Applied To Forage After First-cut*

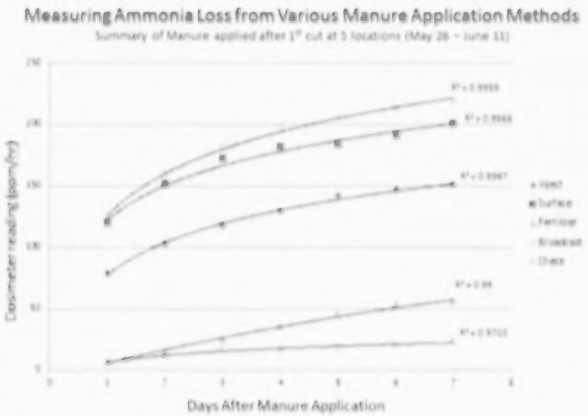

***Figure 2** – Ammonia Loss*

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Average of all Cuts After Application						
Treatment	Yield Adjusted for DM		Quality		Yield + Quality Adjusted for DM	
	tons /ac	% Δ	lbs milk / ton	% Δ	lbs milk / ac	% Δ
Fertilizer	2.55	2.4	3,069	1.1	7,826	3.4
Splash Plate	2.64	5.7	3,038	0.1	8,020	5.8
Surface Band	2.64	5.7	3,040	0.2	8,026	5.8
Injected	2.82	11.7	3,052	0.6	8,607	12.2
Zero Check	2.49	---	3,035	---	7,557	---
Represents Oxford Centre, Salford, Brooksdale locations – 2nd, 3rd & 4th cuts						
[1] Milk2006 is an Excel spreadsheet that uses the forage analysis (CP, ADF, NDF and NDFd) to calculate an approximation of a balanced ration using NRC values. In the summary tables below, *MILK2006* was used with all preset defaults except forage quality parameters						

***Figure 3** - 2012 Yield and Quality[1] Comparison of Manure vs Fertilizer Applied to Forages*

Bottom Line

A corn crop still makes the most economic use of spring applied liquid manure. When application to forages is beneficial to managing manure storage capacity, work load and crop fertility program, there is also an economic advantage to forage yield and overall forage quality. Combining the 2012 results with yield comparisons from previous years (2006-2011) overall yield increase was 2.6 percent from applying commercial fertilizer and 7.0 percent from applying manure compared to no added fertility. Quality increase over the same period showed a 4.5 percent increase in milk/acre from commercial fertilizer compared to 8.4 percent increase in milk/acre from manure application when compared to non-fertilized checks.

Cover Crops Can Provide Much Needed Forage

By Scott Banks, Emerging Crop Specialist & Nancy Noecker, Cow-Calf Specialist, OMAF/MRA

There is a lot of interest in double-cropping and growing cover crops this fall because of limited forage supplies and the success of these crops in 2012. In addition to providing much needed feed and pasture, there are several agronomic advantages to cover crops. These include erosion protection, nitrogen scavenging, nutrient cycling, building organic matter, improving soil structure and breaking pest cycles.

With the optimism in corn, soybeans and wheat and other cash crops, there is more pressure on each acre of land to produce. Hay and pasture acres have given way to corn, soybeans and wheat. Forage supplies are tight. Double cropping after a cereal crop using a cover crop such as oats is an opportunity to grow additional forage for your livestock. Research has shown that oats seeded after winter wheat harvest can yield 1 to 3.5 tonne per acre where manure was applied. Even in fields without manure, oats can yield 0.5 – 1.5 tonne per acre for forage. At current hay prices of $150 per tonne or more, cover crops can provide an excellent return.

Which Cover Crop Works Best?

Farmers have used a variety of species. Figure 1 shows the result of a 2005 Cover Crop Study comparing oats, oilseed radish, peas, red clover, annual ryegrass, and sudan grass planted after winter wheat harvest, with and without an application of manure. Cover crop yields were typically in the 0.5 – 1.0 tonne per acre range. Red clover (broadcast into the winter wheat in the spring), annual ryegrass with manure applied, and oats produced the most forage yield. Volunteer winter cereals left to grow yielded only 50 - 75% of the oat forage yield. At another site where the cover crops were planted after spring wheat, the volunteer spring wheat yielded about the same as many of the cover crops.

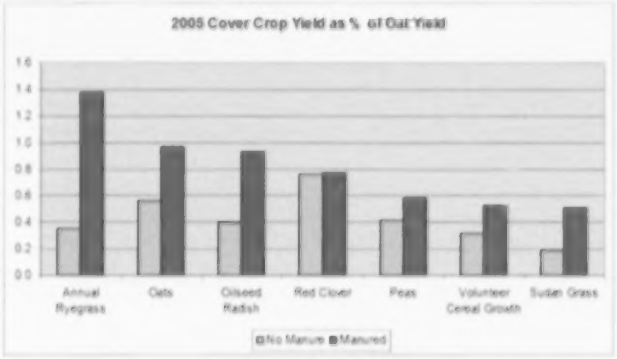

***Figure 1**: 2005 Cover Crop Study Which Compared Oats, Oilseed Radish, Peas, Red Clover, Annual Ryegrass And Sudan Grass*

Establishment

Establishing a cover crop can be done using a no-till drill. An alternative is to broadcast the seed on the field, followed by a light tillage pass using a cultivator or rotary harrow to incorporate the seed. Plant the seed at 1.5 inch (3.75 mm) depth. Some tillage can reduce the disease pressure from the preceding cereal crop. Under dry conditions, following with a packer will firm the soil for better seed-to-soil contact and help retain moisture for better emergence. Manure can be applied immediately before planting. Incorporation of manure will capture more of the readily available nitrogen.

Harvest By Grazing

Harvesting the cover crop using strip grazing with cattle or sheep can be more efficient than cutting and baling. Cereal crops are usually ready to begin grazing about 45

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***Figure 2**: Barley seeded following winter wheat for fall grazing.*

days after planting (Figure 2). They should be grazed before the head-stage of the cereals, as forage quality begins to decline.

***Figure 3**: Strip Grazing of Kale, Pea, Barley & Oat mixture*

A question that often is asked is "does late fall and winter grazing compact the soil"? Research from Nebraska showed beef cattle winter grazing crop residues had no significant effect on the following year grain crop yield, and additional tillage was not required. However, spring grazing increased the soil bulk density and decreased water infiltration rate. Therefore cattle should not graze crop residues after the soil has thawed in the spring.

Agronomic Benefits

There are several agronomic benefits to using cover crops following a cereal crop. It provides soil protection from wind and heavy rains in the fall months before freeze up, builds soil organic matter, and the livestock improves nutrient cycling. With crops such as red clover, nitrogen can be fixed for the following crop. It also provide the livestock farmer a place to spread manure in the late summer and reduces the nitrogen that could be lost to the environment. The direct benefit to the livestock farmer is the extra feed produced, as he gets more from the land, rather than using more land!

Nitrogen Application For High Yielding Soybeans

by Horst Bohner, Soybean Specialist, OMAF/MRA

A high yielding soybean crop requires a tremendous amount of nitrogen (N) – up to 200 - 300 lbs/ac. Nitrogen fixation and residual soil nitrogen may not supply enough N for soybeans that yield over 70 bu/ac. Can "in–season" (early pod set stage) N application significantly increase soybean yield?

Nitrogen fertilizers have not traditionally been applied to soybeans. Up to 75% of the total nitrogen needs are supplied through biological N fixation through nodules on the roots. These nodules are formed in a symbiotic relationship with rhizobia bacteria. The plant provides the bacteria carbohydrates, minerals and a protected growing environment in exchange for N. However, perhaps biological N fixation cannot keep up to the high N demand of a bumper soybean crop. Photo 1 shows a nitrogen deficient soybean leaf, which is often found in many Ontario soybean fields.

There have been a number of studies conducted on supplemental N application. These studies have focused on different application timings, nitrogen products, and rates to determine if there is any advantage to applying additional N to soybeans.

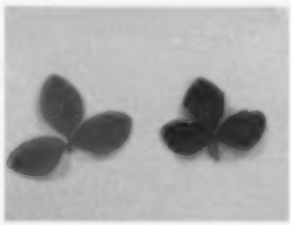

***Photo 1.** Left - a soybean trifoliate leaf with nitrogen deficiency symptoms, appearing pale green. Right - a healthy soybean trifoliate with no nitrogen deficiency symptoms.*

Pre-plant N Application

Applying N prior to seeding or as a starter fertilizer has not proven to be an effective way of improving net returns. Research from the United States and Ontario show that, while yield gains can be made, they are typically small (less than 2 bu/ac), inconsistant, and are not sufficient to increase profits. Yield gains are highly dependent on the year, where cooler and damper conditions have made N application more likely to result in yield gains. Under very poor growing conditions, low soil organic matter, low inorganic N, and conditions that are poor for nodulation, yield gains appear to be the most consistent. Under normal growing conditions there is usually no measurable yield gain.

Pre-plant N Application When Double Cropping Soybeans

Applying N when the crop is seeded very late in a double cropping situation may provide additional yield (Table 1).

The application of nitrogen in this scenario stimulates early plant development, which may help the soybean plant to make up for lost time earlier in the growing season. In 2012 there was up to 3.4 bu/ac extra yield when applying N to double cropped soybeans. However, an increased seeding rate with no nitrogen fertilizer yielded just as much as lower seeding rates with added nitrogen. Research into late planted soybeans best management practices is ongoing.

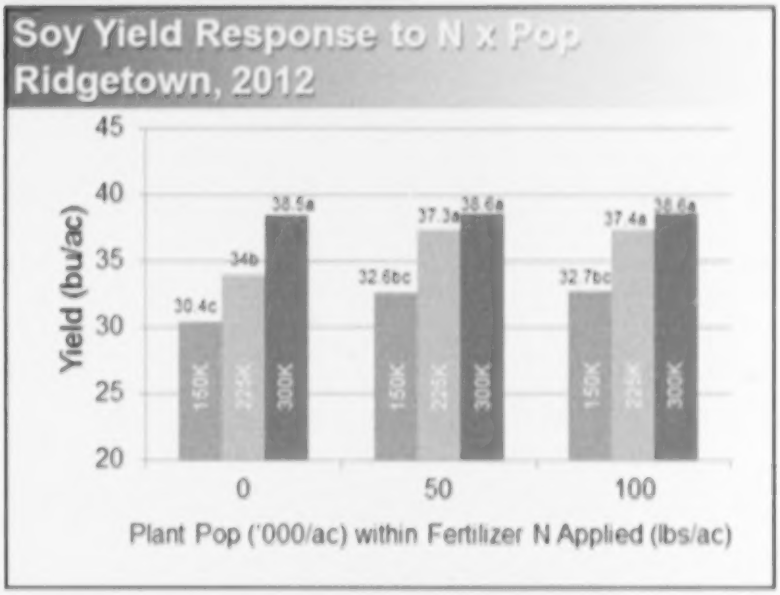

***Table 1** – Soybean yield response to N at different populations.*
Source: Dr. David Hooker, U of G. Ridgetown

In Season (early pod set) Application
The greatest demand for nitrogen is when seeds are developing. At that time of year, soil N reserves are also depleting and N fixation is slowing. Perhaps this is the time of year to apply N to soybeans, especially when yield expectations are high. Trials conducted in Kansas in the late 90's showed a yield increase of 6.9 bu/ac with the application of 20 - 40 lbs/acre of N at the R3 stage. (Wesley et al,1998). However, yield gains were only realized in fields that had yields over 55 bu/ac and were irrigated. This spurred renewed interest in N application for soybeans and was followed up by a large number of studies. Unfortunately, subsequent research (Table 2) across the US Midwest showed inconsistent yield results in normal field situations.

In the Ontario SMART soybean trials, foliar nitrogen was applied during the reproductive stages that coincided with a fungicide application (early R3). 6 L/acre of foliar SRN (slow release nitrogen) was applied in a tank mix with a foliar fungicide. These trials also received 50 lbs/acre of actual N broadcast at seeding time in the form of ESN and ammonium sulphate. Yield gains were disappointingly small and ranged from 2 - 3 bu/ac. They were not economical.

Bottom Line
Nitrogen fertilizer application to normal soybean fields has not provided consistent yield gains. Biological N fixation can provide the majority of required N supply for soybean unless there are soil restrictions for normal nodule activity. There is also evidence that very high yielding fields (over 70 bu/ac) may benefit from additional N, but trials actually yielding that high have been limited.(F. Salvagiotti et al) Experience has shown little to no yield increase regardless of timing. Neither pre-plant or in-season N application is recommended under normal conditions.

Applying commercial nitrogen fertilizer is an expensive way to replace free nitrogen provided through biological N fixation. There are a few exceptions, where commercial nitrogen does make sense, such as a nodulation failure in a first time field. Fields with yield potential over 70 bu/ac still warrant more investigation. The best strategy for normal soybean production to make sure beans have adequate nitrogen is to inoculate seed before planting. Ontario trials have shown a yield gain of 1.2 bushels per acre when seeding soybeans treated with an inoculant.

N Application	Seed Yield	Seed Protein	Seed Oil	Seed N Removal
	bu/acre	%	%	lb/acre
Control	49.4	37.2	19.6	154
Broadcast urea (July)	50.3	37.0	19.6	155
Knifed urea (July)	50.3	37.4	19.6	157
Broadcast poly-coated urea (July)	51.0	37.4	19.5	159
Knifed poly-coated urea (July)	50.3	37.5	19.5	157
Broadcast urea (August)	50.3	37.6	19.5	158
Significance (0.05)	NS	Sign.	NS	Sign.

July application in third week of July, R2 growth stage. August application in second week of August, R4 - R5 growth stage. Knifed = six inch placement depth. Broadcast = over-the-canopy with no incorporation. All N applications at 75 lb N/acre. University of Minnesota.

***Table 2.** Effect of in-season N fertilizer application to soybean from 12 site-years in Minnesota, 1998-1999, adapted from Schmitt et al., 2001.*

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